DISCUSSION OF THE AMENDMENT

Claims 1-21 and 41-87 are active in the present application. Claims 63-87 are new claims. Support for new Claims 63-86 is found in paragraphs [0045], [0055], [0071], and [0113] of the PG publication corresponding to the present application (i.e., U.S. 2004/0089001). Support for new Claim 87 is found in previously presented Claims 4, 6 and 7.

No new matter is believed to have been added by this amendment.

REMARKS

The Office asserted that the adsorption heat pump of the present claims is anticipated and/or obvious over a publication to Komarneni (High Performance Nanocomposite Desiccation Materials, 1992). Applicants submit that the prior art relied on by the Office does not describe a heat adsorption pump but instead describes a desiccant cooling system. The dessicant cooling system of the prior art is not the same as heat adsorption pump of the claimed invention.

Applicants draw the Office's attention to the third page of Komarneni which provides an Abstract of the Komarneni publication. The disclosure identified as "informational item 17" on page 3 characterizes the Komarneni invention as "Desiccant, Water Adsorption, Zeolite, Aluminophosphate Molecular Sieves, Silicoaluminophosphate Molecular Sieves, Desiccant Cooling System, Nanocomposites" (underlining added for emphasis). None of the devices and/or applications described in item no. 17 on page 3 of Komarneni is the presently claimed adsorption heat pump.

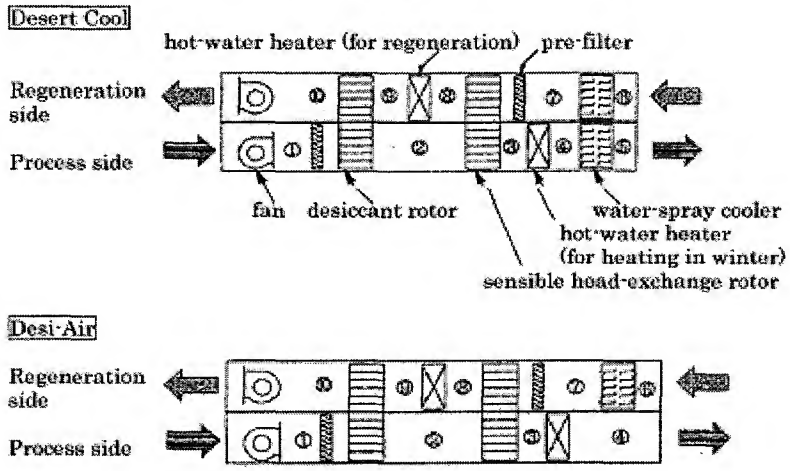
The dessicant cooling device of Komarneni works by a substantially different principle in comparison to the heat adsorption pump of the present claims. Applicants submit that those of ordinary skill in the art readily recognize that a dessicant cooling device is not the same as a heat adsorption pump. A description of a desiccant cooling system published in Energy Saving, Vol. 46, No. 14 (1994), pp. 83-85 is submitted herewith. The English translation of the "Energy Saving" publication shows that a desiccant cooling system works on the principle of dehumidifying air by passing air over a dessicant material to remove water in the form of humidity from the air. After undergoing an isothermal dehumidification process, the dehumidified air is cooled and then introduced into an environment such as a building for cooling purposes. Applicants draw the Office's attention to the fourth full paragraph of the "Energy Saving" publication which discloses:

> In DSC, at first attention is paid to the moisture (latent heat) and the moisture in the air is removed, and then the "dry air" is suitably cooled and supplied to the interior of a room. This cooling does not rely on a flon-based refrigerator but merely utilizes a heat exchanger and a water spraying evaporator.

Thus, in desiccant cooling systems the desiccant serves to dehumidify an air stream by removing moisture from the air stream before the air stream is cooled. By carrying out cooling of a dehumidified gas stream, the prior art dessicant cooling system may be made more efficient. The dessicant cooling system improves the comfort of people who are in an environment of the cooled air because the cooled air has lower humidity levels.

The diagrams of the attached "Energy Saving" publication show how air is treated with the prior art device. The air is first *passed through* a desiccant absorber (see the figures on the third to the last page of the attached publication which show that a "dessicant rotor" is included in the prior art dessicant cooling system, reproduced below for convenience).

Fig. 1: Schematic view of equipment structure and air flow



Note 1. All external air intake is possible both in the process side and regeneration side.
2. Desert Cool is different in structure merely by mounting a water-spray cooler at the supply outlet of Desi-Air.

The figures of the attached "Energy Saving" publication show that a water-spray cooler must be present in the prior art device in order for there to be cooling. In the absence

of sufficient cooling provided by a component such as a spray cooler the air passing through a dessicant cooling system is dessicated but not cooled.

As stated above, after the air in the prior art device is dehumidified, the air must pass through a cooler in order for the air to be cooled. The desiccant of the prior art desiccant cooling system serves to dehumidify the air stream by adsorbing water from the air stream when the air stream is passed through the dessicant. The prior art dessicant does not provide a cooling function.

In contrast, the vaporization part of the presently claimed invention functions to provide a cooling source, e.g., the vaporization part generates cold. An air stream may be cooled by the cold generated from the vaporization part without passing the air stream through any adsorbent in the vaporization part. The cold is generated using the vaporization part to vaporize an adsorbate and subsequently adsorb the adsorbate onto an adsorbent. The actions of vaporization and adsorbing that are carried out by the vaporization part of the presently claimed invention function to generate cold. The cold can subsequently be used to cool an air stream. As already mentioned, the prior art desiccant cooling system of Komarneni does not provide cooling by adsorption and requires the air stream to be passed through the prior art dessicant.

Applicants submit that the presently claimed invention is patentable over the prior art relied on by the Office at least because the cited prior art does not disclose or suggest the use of the adsorbent recited in the present claims to carry out a cooling function.

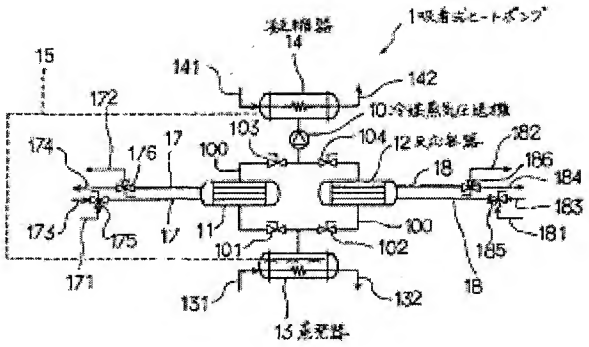
Applicants draw the Office's attention to new dependent Claims 63-86. The new dependent claims include a functional limitation with respect to the vaporization part and adsorbate recited in the present claims. Applicants submit that the new dependent claims are further patentable over the cited prior art because the cited prior art, as explained above, does not disclose or suggest the functional features of the claimed invention.

Moreover, those of ordinary skill in the art would not expect the dessicant of Komarneni to be useful in a vaporization part that generates cooling (e.g., such as the vaporization part of the presently claimed invention). For example, Komarneni discloses the use of the prior art dessicant only for the dehumidification of air, not for adsorbing a refrigerant material (adsorbate) as part of a vaporization/adsorption cooling cycle. The Komarneni dessicant cooling system removes small amounts of water from an air stream whereas the vaporization part of the claimed invention requires the cyclical adsorption and vaporization of large amounts of a refrigerant (adsorbate).

Those of ordinary skill in the art would not use the dessicant of Komarneni as the adsorbent of the prior art adsorption heat pumps of Hiroyuki. Conventional adsorption heat pumps utilize adsorption occurring under low pressure conditions. For example, Hiroyuki describes a cooling system that includes a decompressed regeneration system, e.g., a depressurized vaporization/adsorption component (see paragraph [0013] of Hiroyuki; underlining added for emphasis).

> It consists of a refrigerant steamy gas compressor which performs pressure-up transportation of a refrigerant steam and this refrigerant steamy gas compressor is in the adsorption equation heat pump characterized by being constituted so that the above-mentioned reaction container in a playback process may be decompressed.

This difference from the presently claimed invention is also evident from Figure 1 of Hiroyuki which shows the prior art adsorption heat pump includes a component for decompressing the prior art vaporization/adsorption system (see reference no. 10 in Figure 1 below).



It would not be obvious to use the dessicant of Komarneni in the adsorption heat pump of Hiroyuki because the Komarneni dessicant is used in a completely different temperature and pressure realm (e.g., at atmospheric temperature and pressure conditions in the presence of very low partial pressure of water) in comparison to the vaporization/adsorption cycle of Hiroyuki (e.g., low pressure and high temperature in the presence of high partial pressure of water). For this reason, among others, those of skill in the art would not combine Hiroyuki and Komarneni.

For the reasons discussed above, Applicants submit that all now-pending claims are in condition for allowance and respectfully request withdrawal of the rejections.

Respectfully submitted,

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